

AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraphs beginning at page 1, lines 4-5, as follows:

~~BACKGROUND OF THE INVENTION~~

The ~~present invention disclosed technology~~ relates to a retainer and a one-way clutch using the retainer as well as to a method for assembling the one-way clutch.

Please amend the paragraphs beginning at page 4, line 20 through page 6, line 24, as follows:

~~SUMMARY OF THE INVENTION~~

Accordingly, an object ~~of the present invention~~ is to provide a retainer which allows a one-way clutch to be assembled with simplicity and low cost without using any exclusive-use equipment, as well as a one-way clutch using the retainer, and also provide a method for assembling the one-way clutch.

In order to achieve the above object, in a first aspect ~~of the present invention~~, there is provided a retainer comprising:

two annular portions; and

a plurality of pillar portions for connecting the two annular portions to each other to define a plurality of pockets in combination with the annular portions, wherein

an engagement portion to be engaged with an outer ring is formed on an outer periphery of at least one annular portion of the two annular portions and

part of each of the pillar portions located on the annular portion side to block the retainer from rotating circumferentially relative to the outer ring,

a non-engagement outer peripheral surface which is not engaged with the outer ring is formed on an outer peripheral surface of the other annular portion and part of each of the pillar portions located on the annular portion side, and

the non-engagement outer peripheral surface is located inside a circle smaller by a specified size than a circumcircle of the engagement portion.

In assembling of a one-way clutch with the retainer according to the first aspect of the invention, first, rollers are placed in the pockets of the retainer and moreover the biasing members are placed between the pillar portions of the retainer and the rollers, by which a retainer assembly is formed. Next, the non-engagement outer peripheral surface of the retainer of the retainer assembly is inserted axially in an non-engagement state to between an inner peripheral engagement surface of the outer ring and an outer peripheral surface of an inner ring of the one-way clutch such that part of the roller is placed at a position where the roller is clearance-fitted between the inner peripheral engagement surface of the outer ring and the outer peripheral surface of the inner ring of the one-way clutch. Next, the retainer assembly is rotated until a peripheral position of the engagement portion of the retainer and a peripheral position of an engagement portion of the outer ring becomes coincident with each other, and thereafter the retainer assembly is inserted

axially all the way to the end between the inner peripheral engagement surface of the outer ring and the outer peripheral surface of the inner ring so that the engagement portion of the retainer and the engagement portion of the outer ring are engaged with each other. Thus, the assembly of the one-way clutch is completed.

According to the retainer of the first aspect of the present invention, since a non-engagement outer peripheral surface positioned inside a circle smaller by a specified size than the circumcircle of the engagement portions of the retainer is provided on the outer peripheral surface of the other annular portion and part of each of the pillar portions positioned on the annular portion side, part of the roller can be inserted beforehand at a clearance-fit position between the inner peripheral engagement surface of the outer ring and the outer peripheral surface of the inner ring before making the engagement portion of the retainer and the engagement portion of the outer ring coincident with each other in peripheral position and inserting the retainer assembly to between the inner peripheral engagement surface of the outer ring and the outer peripheral surface of the inner ring of the one-way clutch.

Please amend the paragraphs beginning at page 8, line 6 through page 10, line 1, as follows:

In a second aspect of the invention, there is provided a retainer comprising:

two annular portions; and

a plurality of pillar portions for connecting the two annular portions to each other to define a plurality of pockets in combination with the annular portions, wherein

an engagement portion to be engaged with an inner ring is formed on an inner periphery of at least one annular portion of the two annular portions and part of each of the pillar portions located on the annular portion side to block the retainer from rotating circumferentially relative to the inner ring,

a non-engagement inner peripheral surface which is not engaged with the inner ring is formed on an inner peripheral surface of the other annular portion and part of each of the pillar portions located on the annular portion side, and

the non-engagement inner peripheral surface is located outside a circle larger by a specified size than a circumcircle of the engagement portion.

In assembling of a one-way clutch with the retainer according to the second aspect of the invention, first, rollers are placed in the pockets of the retainer and moreover the biasing members are placed between the pillar portions of the retainer and the rollers, by which a retainer assembly is formed. Next, the non-engagement inner peripheral surface of the retainer of the retainer assembly is inserted axially in a non-engagement state to between an inner peripheral surface of an outer ring and an outer peripheral engagement surface of the inner ring of the one-way clutch such that part of the roller is

placed at a position where the roller is clearance-fitted between the inner peripheral surface of the outer ring and the outer peripheral engagement surface of the inner ring of the one-way clutch. Finally, the retainer assembly is rotated until a peripheral position of the engagement portion of the retainer and a peripheral position of an engagement portion of the inner ring becomes coincident with each other, and thereafter the retainer assembly is inserted axially all the way to the end between the inner peripheral surface of the outer ring and the outer peripheral engagement surface of the inner ring so that the engagement portion of the retainer and the engagement portion of the inner ring are engaged with each other. Thus, the assembly of the one-way clutch is completed.

According to the retainer of the second aspect of the present invention, since a non-engagement inner peripheral surface positioned outside a circle larger by a specified size than the circumcircle of the engagement portions is provided on the inner peripheral surface of the other annular portion and part of the pillar portions positioned on the annular portion side, part of the roller can be inserted beforehand at a clearance-fit position between the inner peripheral surface of the outer ring and the outer peripheral engagement surface of the inner ring before making the engagement portion of the retainer and the engagement portion of the inner ring coincident with each other in peripheral position and inserting the retainer assembly to between the inner peripheral surface of the outer ring and the outer peripheral engagement

surface of the inner ring of the one-way clutch. Therefore, because there is no need for moving the rollers located near wedge positions to near the clearance-fit positions by using some exclusive-use equipment, which would be needed in the conventional assembling method for one-way clutches, the one-way clutch can be assembled with simplicity and low cost and without involving any exclusive-use equipment with the use of the retainer of the second aspect of the invention.

Please amend the paragraphs beginning at page 11, line 8 through page 16, line 1, as follows:

Also in the first aspect of the invention, there is provided a one-way clutch comprising:

an outer ring having an inner peripheral engagement surface which is a cam surface having a generally polygonal shape in its cross section;

an inner ring having an outer peripheral surface which is a circumferential surface;

the retainer of the first aspect of the invention placed between the inner peripheral engagement surface and the outer peripheral surface;

rollers placed in the pockets of the retainer; and

biasing members for respectively biasing the rollers in one circumferential direction.

According to the one-way clutch of the first aspect of the invention, since the retainer of the first aspect of the invention is included, the retainer assembly in which the rollers are placed in the pockets of the retainer and in which the biasing members are placed between the pillar portions of the retainer and the rollers can be inserted to between the outer peripheral surface of the inner ring and the inner peripheral engagement surface of the outer ring with simplicity and low cost without using any exclusive-use equipment. Therefore, the one-way clutch can be assembled with simplicity and low cost.

In a second aspect of the present invention, there is provided a one-way clutch comprising:

- an outer ring having an inner peripheral surface which is a circumferential surface;

- an inner ring having an outer peripheral engagement surface which is a cam surface having a generally polygonal shape in its cross section;

- the retainer of the second aspect of the invention placed between the inner peripheral surface and the outer peripheral engagement surface;

- rollers placed in the pockets of the retainer; and

- biasing members for respectively biasing the rollers in one circumferential direction.

According to the one-way clutch of the second aspect of the invention, since the retainer according to the second aspect of the invention is included, the retainer assembly in which the rollers are placed in the pockets of the

retainer and the biasing members are placed between the pillar portions of the retainer and the rollers can be inserted to between the outer peripheral engagement surface of the inner ring and the inner peripheral surface of the outer ring with simplicity and low cost without using any exclusive-use equipment. Therefore, the one-way clutch can be assembled with simplicity and low cost.

Also in the first aspect of the invention, there is provided a method for assembling a one-way clutch comprising:

forming a retainer assembly by respectively placing rollers in the pockets of the retainer of the first aspect of the invention and placing biasing members such that each biasing member is disposed between the pillar portion of the retainer and the roller corresponding to the pillar portion;

inserting the non-engagement outer peripheral surface of the retainer of the retainer assembly axially in a non-engagement state to between an inner peripheral engagement surface of an outer ring and an outer peripheral surface of an inner ring of the one-way clutch so that the roller of the retainer assembly is disposed in a position where the roller is clearance-fitted between the inner peripheral engagement surface of the outer ring of the one-way clutch, which is a cam surface having a generally polygonal shape in its cross section, and the outer peripheral surface, which is a circumferential surface of the inner ring; and

rotating the retainer assembly such that the engagement portion of the retainer becomes coincident in peripheral position with the engagement portion of the outer ring and thereafter further inserting the retainer assembly axially between the outer peripheral surface of the inner ring and the inner peripheral engagement surface of the outer ring such that the engagement portion of the retainer and the engagement portion of the outer ring are engaged with each other.

According to the method for assembling the one-way clutch of the first aspect of the invention, the one-way clutch can be assembled with simplicity and low cost without using any exclusive-use equipment.

Also in the second aspect of the invention, there is provided a method for assembling a one-way clutch comprising:

forming a retainer assembly by respectively placing rollers in the pockets of the retainer of the second aspect of the invention and placing biasing members such that each biasing member is disposed between the pillar portion of the retainer and the roller corresponding to the pillar portion;

inserting the non-engagement inner peripheral surface of the retainer of the retainer assembly axially in a non-engagement state to between an inner peripheral surface of an outer ring and an outer peripheral engagement surface of an inner ring of the one-way clutch so that the roller of the retainer assembly is disposed in a position where the roller is clearance-fitted between the inner peripheral surface, which is a circumferential surface of the outer ring, and the

outer peripheral engagement surface, which is a cam surface of the inner ring having a generally polygonal shape in its cross section, of the inner ring of the one-way clutch; and

rotating the retainer assembly such that the engagement portion of the retainer becomes coincident in peripheral position with the engagement portion of the inner ring and thereafter further inserting the retainer assembly axially between the outer peripheral engagement surface of the inner ring and the inner peripheral surface of the outer ring such that the engagement portion of the retainer and the engagement portion of the inner ring are engaged with each other.

According to the method for assembling the one-way clutch of the second aspect of the invention, the one-way clutch can be assembled with simplicity and low cost without using any exclusive-use equipment.

According to the retainer of the first aspect of the invention, a non-engagement outer peripheral surface positioned inside a circle smaller by a specified size than the circumcircle of the engagement portions of the retainer is provided on the outer peripheral surface of the other annular portion and part of each of the pillar portions positioned on the annular portion side. Therefore, part of the roller of the retainer assembly wherein the retainer assembly is formed by setting the rollers and the biasing members in the retainer can be inserted beforehand at clearance-fit positions between the inner peripheral engagement surface of the outer ring and the outer peripheral

surface of the inner ring before making the engagement portion of the retainer and the engagement portion of the outer ring coincident with each other in peripheral position and inserting the retainer assembly to between the inner peripheral engagement surface of the outer ring and the outer peripheral surface of the inner ring of the one-way clutch. Therefore, because there is no need for moving the rollers located near wedge positions to near the clearance-fit positions by using some exclusive-use equipment, which would be needed in the one-way clutch assembling method using conventional retainers, the one-way clutch can be assembled with simplicity and low cost.

Please amend the paragraph beginning at page 17, line 6, as follows:

According to the retainer of the second aspect of the invention, a non-engagement inner peripheral surface positioned outside a circle larger by a specified size than the circumcircle of the engagement portions is provided on the inner peripheral surface of the other annular portion and part of each of the pillar portions positioned on the annular portion side. Therefore, part of the rollers of the retainer assembly wherein the retainer assembly is formed by setting the rollers and the biasing member in the retainer can be inserted beforehand at clearance-fit positions between the inner peripheral surface of the outer ring and the outer peripheral engagement surface of the inner ring before making the engagement portion of the retainer and the engagement portion of the inner ring coincident with each other in peripheral position and

inserting the retainer assembly to between the inner peripheral surface of the outer ring and the outer peripheral engagement surface of the inner ring of the one-way clutch. Therefore, because there is no need for moving the rollers located near wedge positions to near the clearance-fit positions by using some exclusive-use equipment, which would be needed in the one-way clutch assembling method using conventional retainers, the one-way clutch can be assembled with simplicity and low cost.

Please amend the paragraphs beginning at page 18, line 10 through page 19, line 1, as follows:

According to the one-way clutch of the first aspect of the invention, since the retainer of the first aspect of the invention is included, the retainer assembly can be inserted to between the inner peripheral engagement surface of the outer ring and the outer peripheral surface of the inner ring with simplicity without using any exclusive-use equipment. Thus, the one-way clutch can be assembled with simplicity and low cost.

Further, according to the one-way clutch of the second aspect of the invention, since the retainer of the second aspect of the invention is included, the retainer assembly can be inserted to between the inner peripheral surface of the outer ring and the outer peripheral engagement surface of the inner ring with simplicity without using any exclusive-use equipment. Thus, the one-way clutch can be assembled with simplicity and low cost.

Further, according to the method for assembling the one-way clutch of the first and second aspects of the invention, the one-way clutch can be assembled with simplicity and low cost without using any exclusive-use equipment.

Please amend the paragraph beginning at page 19, line 8, as follows:

FIG. 1 is a view showing an embodiment of the retainer in a first aspect of the present invention;

Please amend the paragraph beginning at page 19, line 16, as follows:

FIG. 4 is a front view showing an embodiment of the retainer in a second aspect of the present invention;

Please amend the paragraph beginning at page 19, line 23, as follows:

~~DETAILED DESCRIPTION OF THE INVENTION~~

Please amend the paragraph beginning at page 20, line 4, as follows:

FIG. 1 shows a retainer for use with a one-way clutch according to an embodiment of the retainer in a first aspect of the invention. The retainer includes an annular portion 2, an annular portion 3 confronting the annular portion 2, and six pillar portions 4 for connecting the annular portion 2 and the annular portion 3 to each other. Six pockets 7 are formed between the six

pillar portions 4. It is noted that reference numeral 8 denotes a protruding portion to which an unshown coil spring as an example of biasing member is to be fitted.

Please amend the paragraphs beginning at page 27, lines 5-13, as follows:

In short, the portion ranging from the outer end of the annular portion to the axially extending parts of the pillar portions may be provided in any shape only if the portion ranging from the outer end of the annular portion to the axially extending parts of the pillar portions is entirely included inside the circle smaller by a specified size than the circumcircle of the engagement portions.

In this embodiment, the edges 9 that are the engagement portions of the retainer are formed in the portions each ranging from the axial outer end of the annular portion 2 in the outer peripheral surface of the annular portion 2 to part of the pillar portions 4. However, ~~for the present invention,~~ the engagement portions of the retainer may be formed at at least one of either annular portion and part of the pillar portions.

Please amend the paragraph beginning at page 31, line 19, as follows:

Further, in the retainer of this embodiment, the six vertices 46 of the inner peripheral surface 41 serving as engagement portions of the retainer are

formed in the portions each ranging from the axial outer end of the annular portion 51 in the outer peripheral surface of the annular portion 51 to part of the pillar portion 47. However, ~~for the present invention,~~ the engagement portions of the retainer may be formed at at least one of either annular portion of the two and part of the pillar portions.